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अंतर्दाही इंजन — चार स्ट्रोक स्फुलिंग प्रज्ज्वलित इंजन-चालित वाहनों के लिए क्रैंक-केस गैसों के उत्सर्जन के सत्यापन की पद्धति

Indian Standard

INTERNAL COMBUSTION ENGINES — METHOD OF VERIFICATION OF EMISSION OF CRANKCASE GASES FOR VEHICLES POWERED WITH FOUR STROKE SPARK IGNITION ENGINES

UDC 621·432·3·019·9 : 629·11

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NEW DELHI 110002

July 1993

Price Group 2

Automotive Primemovers Sectional Committee, TED 2

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Primemovers Sectional Committee had been approved by the Transport Engineering Division Council.

The present day emphasis is on controlling of emissions from automobiles. For evaluating emission at crankcase a standard was felt necessary and it resulted in the preparation of this Indian Standard.

This specification deals with the emission of crankcase gases from a four stroke Spark Ignition engine with positive ventilation system.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

INTERNAL COMBUSTION ENGINES — METHOD OF VERIFICATION OF EMISSION OF CRANKCASE GASES FOR VEHICLES POWERED WITH FOUR STROKE SPARK IGNITION ENGINES

1 SCOPE

This standard covers the method of verification of emission of crankcase gases for vehicles fitted with four stroke spark ignition engines having positive crankcase ventilation system.

2 TERMINOLOGY

For the purpose of this standard the following definitions shall apply.

2.1 Spark Ignition (SI) Engine

An engine in which ignition is effected by means of an electric spark.

2.2 Four Stroke SI Engine

A spark ignition engine in which an engine cycle is completed in two revolutions of the crankshaft.

2.3 Idling Speed

It is the minimum speed in rev/min recommended by the manufacturer to be set during idling.

2.4 Engine Crankcase

It means the spaces internal or external to an engine which are connected to the oil sump by internal or external ducts through which gases and vapours escape.

2.5 Crankcase Blowby

The combustion gases that leak past the piston into the crankcase.

3 CONFORMITY STANDARD FOR CRANKCASE GASES

The engine crankcase ventilation system shall not permit the emission of crankcase gases into the atmosphere.

4 TEST CONDITIONS

4.1 Idling speed shall be regulated as per manufacturer's recommendations.

4.2 The verification shall be carried out in the following three sets of conditions of engine operation.

Conditions No.	*Vehicle Speed* (km/h)	*Power Absorbed by Brake*
1	Idling	Nil
2	50 ± 2	As per road load condition
3	50 ± 2	1·7 times road load at condition No. 2

NOTE — Generally road load is 60 percent of full load measured with wide open throttle at specified speed.

4.3 This test shall be carried out on an adequately run engine. The engine shall be warmed up at a speed specified by the manufacturer before commencement of the test.

4.4 The test shall be conducted on chassis dynamometer.

5 TEST METHOD

5.1 For the operation conditions as listed in **4.2**, reliable functioning of the crankcase ventilation system shall be checked.

6 METHOD OF VERIFICATION OF THE CRANKCASE VENTILATION SYSTEM

6.1 The engine's apertures shall be left as per manufacturers' recommendation.

6.2 The pressure in the crankcase shall be measured at the dipstick hole with an inclined tube manometer.

6.3 The vehicle shall be deemed satisfactory, if in every condition of verification defined in **4.2**, the pressure measured in the crankcase does not exceed the atmospheric pressure prevailing at the time of verification.

6.4 For the test by the method described above, the pressure in the intake manifold shall be measured to an accuracy of ± 1 kPa.

6.5 The vehicle speed as indicated at the dynamometer shall be measured to an accuracy of ± 2 km/h.

6.6 The pressure measured in the crankcase shall be measured to an accuracy of ± 0·01 kPa.

6.7 During one of the conditions of verification defined in **4.2**, the pressure measured in the crankcase exceeds the atmospheric pressure, an additional test as defined in **7** shall be performed, if requested by the manufacturer.

7 ADDITIONAL TEST METHOD

7.1 The engine's apertures shall be left as found.

7.2 A flexible bag impervious to crankcase gases and having a capacity of approximately five litres shall be connected to the dipstick hole. The bag shall be empty before each verification.

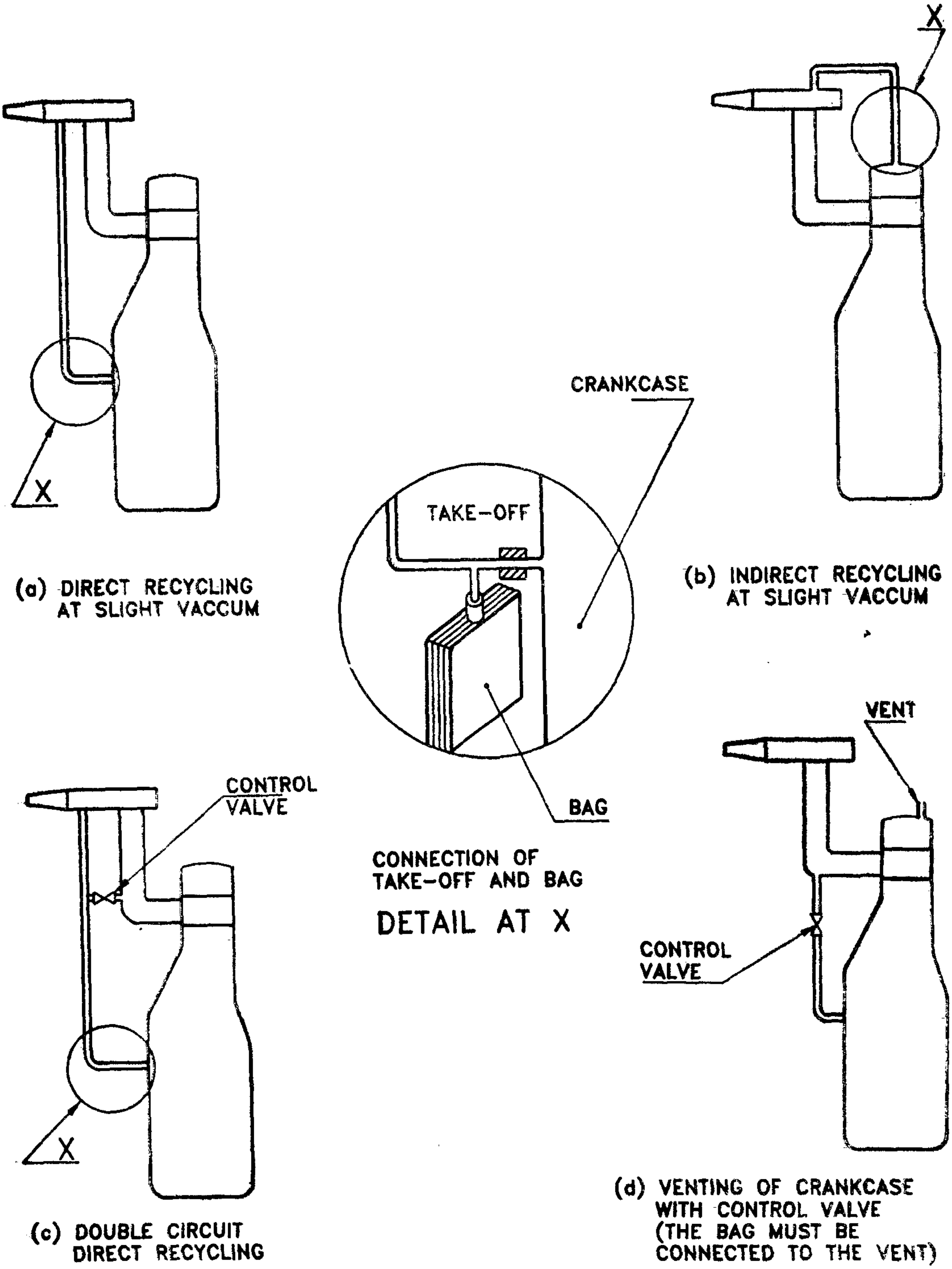
7.3 The bag shall be closed before each verification. It shall be opened to the crankcase for five minutes for each condition of verification prescribed in **4.2**.

7.4 The vehicle shall be deemed satisfactory, if in every condition of verification defined in **4.2**, no visible inflation of the bag occurs.

7.5 If the structural layout of the engine is such that the test cannot be performed by the methods described in **7.1** to **7.4**, the verification shall be carried out by the method modified as follows.

7.5.1 Before the test, all apertures other than those required for the recovery of the gases shall be closed.

7.5.2 The bag shall be placed on a suitable take-off (*see* Fig. 1) which does not introduce any additional loss of pressure and is installed on the recycling circuit of the device directly at the engine-connection aperture.



(a) DIRECT RECYCLING AT SLIGHT VACCUM

(b) INDIRECT RECYCLING AT SLIGHT VACCUM

(c) DOUBLE CIRCUIT DIRECT RECYCLING

(d) VENTING OF CRANKCASE WITH CONTROL VALVE (THE BAG MUST BE CONNECTED TO THE VENT)

Fig. 1 Testing Arrangement for Verification of Crankcase Gases

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